

THEREFORE I CLAIM

1. A thruster adapted to be mounted at an operating location at
a transom of a boat, having bottom and side wall sections having
5 rear end portions adjacent to the transom and a water line at the
transom, said thruster comprising:
 - a) a central thrusting section which has a lengthwise axis
and comprises a central housing that defines a through
passageway and two oppositely positioned outer end
10 portions, each of which defines an end opening;
 - b) a propeller section positioned in said through
passageway;
 - c) two extension members that are positioned at opposite
sides of the central housing, with each extension
15 member having an inner end portion adjacent to a
related one of said outer end portions of the central
housing and extending outwardly therefrom, each
extension member having a lower perimeter edge
portion which is located so that with the thruster in an
20 operating position, and with the boat being in a lateral

thrust operating mode, the perimeter edge portions of the two extension members are below the water line of the boat, each extension member having a lower downwardly facing surface that defines a flow passageway at the downwardly facing surface, said flow passageway having an inner end flow passageway portion adjacent one of the end openings of the center housing;

d) said thruster being configured and arranged, so that with the thruster located at the transom in its operating position:

i) when the boat is traveling at a sufficient speed through the water to cause the water to separate from the transom and form a transom wake surface, the thruster is substantially clear of the water that is at the transom wake surface, and

ii) when the thruster is operating and the boat is in a lateral thrust operating mode, the two extension members have their lower

perimeter edge portions located so that as
water flows by the lower perimeter edge
portions and into one of the end openings
of the center housing, ambient air is
5 substantially prevented from being
entrained in the water entering into the
center housing.

2. The thruster as recited in claim 1, wherein each end opening
10 of the housing is defined by a surrounding rim, and at least a
substantial portion of the perimeter edge portion of the
extension member which is adjacent to that surrounding rim
is below an upper portion of said surrounding rim.

15 3. The thruster as recited in claim 2, wherein said substantial
portion of the perimeter edge portion of each extension
member is below the upper portion of the surrounding rim by
a distance that is at least about one-half of a depth
dimension of the end opening defined by the surrounding
20 rim.

4. The thruster as recited in claim 2, wherein said substantial portion of the perimeter edge portion of each extension member is below the upper portion of the surrounding rim by a distance between about one-quarter to three-quarters of a depth dimension of the end opening defined by the surrounding rim.
5. The thruster as recited in claim 1, wherein each end opening of the housing is defined by a surrounding rim defining the end opening, each of said end openings having a depth dimension, each extension member having an inner end portion adjacent to its related end opening, an outer end portion, and a length dimension from said inner end portion to the outer end portion, with a length dimension from said inner end portion to said outer end portion of the extension member being at least as great as the depth dimension of its related end opening.

6. The thruster as recited in claim 5, wherein said length dimension is at least as great as one and one-half times said depth dimension.
- 5 7. The thruster as recited in claim 1, wherein each end opening of the housing is defined by a surrounding rim having a depth dimension, each of said extension members having a maximum width dimension extending from one side of said extension member to the other side thereof, said maximum width dimension being at least about equal to or greater than
10 the depth dimension of the end opening of the housing adjacent to that extension member.
8. The thruster as recited in claim 1, wherein each of said
15 extension members has its downwardly facing surface shaped so the flow passageway has a greater depth dimension at said inner end flow passageway portion and a lesser depth dimension at an outer end portion of said extension member.

9. The thruster as recited in claim 8, wherein said flow passageway has an inward and upward slope to said inner end flow passageway portion.
- 5 10. The thruster as recited in claim 9, wherein the downwardly facing surface of the extension member forms a hydro-dynamically contoured surface that is generally curved upwardly and inwardly to the opening of the housing.
- 10 11. A thruster boat combination comprising:
- a) a boat comprising a hull having a water line, side walls, a bottom wall, and a transom, with said bottom wall comprising two wall sections which extend from side locations in a downward and laterally inward slant to a
- 15 central juncture location of the two bottom wall sections, and with said transom meeting said bottom and side walls at bottom and side edge locations thereof, said boat having a thrust operating mode where the boat is stationary or is moving at a sufficiently low speed so that water remains
- 20 adjacent to the transom;

b) a thruster which is mounted at the transom of the boat so as to provide lateral thrust, said thruster comprising:

i) a central thrusting section which has a lengthwise axis and comprises a central housing that defines a through passageway that is generally aligned with said lengthwise axis and has two oppositely positioned outer end portions, each of which defines an end opening;

ii) a propeller section positioned in said through passageway;

c) two extension members that are positioned at opposite sides of the central housing, with each extension member having an inner end portion adjacent to a related one of said outer end portions of the central housing and extending outwardly therefrom, each extension member having a lower perimeter edge portion which is located so that with the thruster in an operating position and with the boat being in a lateral thrust operating mode, the perimeter edge portions of the two extension members are below the water line of the boat, each extension member having a lower downwardly

facing surface that defines a flow passageway at the downwardly facing surface, said flow passageway having an inner end flow passageway portion adjacent one of the end openings of the central housing;

- 5 d) said thruster being configured and arranged, so that with the thruster located at the transom in its operating position:
- 10 i) when the boat is traveling at a sufficient speed through the water to cause the water to separate from the transom and form a transom wake surface, the thruster is substantially clear of the water that is at the transom wake surface, and
 - 15 ii) when the thruster is operating and the boat is in a lateral thrust operating mode, the two extension members have their lower perimeter edge portions located so that as water flows by the lower perimeter edge portions and into one of the end openings of the center housing, ambient air is substantially prevented from being entrained in the water entering into the
 - 20 center housing.

12. The combination as recited in claim 11, wherein a distance between outer end edges of the two extension members is no greater than about sixty percent and no less than about twenty five percent of a distance between outer edge locations of the transom where the bottom and side walls meet.
13. The combination as recited in claim 11, wherein a distance between outer end edges of the two extension members is no greater than about fifty percent and no less than about thirty percent of a distance between outer edge locations of the transom where the bottom and side walls meet.
14. The combination as recited in claim 11, wherein a distance between outer end edges of the two extensions is no greater than about forty percent of a distance between outer edge locations of the transom where the bottom and side walls meet.

15. The combination as recited in claim 11, wherein a distance
between outer end edges of the two extension members is
no less than about thirty percent of a distance between outer
edge locations of the transom where the bottom and side
5 walls meet.
16. The combination as recited in claim 15, wherein a distance
between outer end edges of the two extensions is no less
than about forty percent of a distance between edge
10 locations of the transom where the bottom and side walls
meet.
17. The combination as recited in claim 12, wherein each end
opening of the housing is defined by a surrounding rim
having a depth dimension, each of said extension members
15 having a maximum width dimension extending from one side
of said extension member to the other side thereof, said
maximum width dimension being at least about equal to or
greater than the depth dimension of the end opening of the
housing adjacent to that extension member.

18. The combination as recited in claim 17, wherein each of said extension members has its downwardly facing surface shaped so that the flow passageway has a greater depth dimension at said inner end flow passageway portion and a lesser depth dimension at an outer end portion of said extension member.
19. The combination as recited in claim 12, wherein a substantial portion of the perimeter edge portion of each extension member is below an upper portion of a surrounding rim defining the end opening of the central housing by a distance that is at least about one-half of a depth dimension of the end opening defined by the surrounding rim.
20. The combination as recited in claim 12, wherein each end opening of the housing is defined by a surrounding rim defining the end opening, each of said end openings have a depth dimension, each extension member having an inner end portion adjacent to its related end opening, an outer end portion, and a length dimension from said inner end portion

to the outer end portion, with a length dimension from said inner end portion to said outer end portion of the extension member being at least as great as the depth dimension of its related end opening.

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21. The combination as recited in claim 20 wherein said length dimension from said inner end portion to said outer end portion of the extension member is at least as great as one and one-half times said depth dimension.
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22. The combination as recited in claim 15, wherein a length dimension of the central housing section of the thruster is between about nine percent to thirty percent of a length dimension between outer edge locations of the transom where the side walls meet the bottom wall.
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23. The combination as recited in claim 15, wherein a length dimension of the central housing section of the thruster is no greater than about thirteen percent to about twenty percent
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of a length dimension between outer edge locations of the transom where the side walls meet the bottom wall.

24. The combination as recited in claim 15, wherein a length
5 dimension of the central housing section of the thruster is about nine percent to three-twentieths of a length dimension between outer edge locations of the transom where the side walls meet the bottom wall.
- 10 25. The combination as recited in claim 11, wherein an upper portion of said center housing of the thruster is at a depth below the water line of the boat which is less than a distance equal to a vertical dimension of the end opening of the passageway of the central housing.
- 15 26. The combination as recited in claim 25, wherein the upper portion of the center housing of the thruster is at or adjacent to the water line of the boat.

27. The combination as recited in claim 11, wherein a vertical dimension of one of the end openings of the passageway of the central housing is no less than about two-thirds of a vertical distance between the water line and a lower portion of the transom of the boat.
28. The combination as recited in claim 11, wherein a vertical dimension of one of the openings of the passageway of the central housing is no less than about three-quarter of a vertical distance between the water line and a lower portion of the transom of the boat.
29. The combination as recited in claim 11, wherein a vertical dimension of one of the openings of the passageway of the central housing is no less than about eighty-one percent of a vertical distance between the water line and a lower portion of the transom of the boat.
30. A thruster adapted to be mounted to a boat at an operating location, said thruster comprising:

- a) a central thrusting section which has a lengthwise axis and comprises a central housing that defines a through passageway and two oppositely positioned outer end portions, each of which defines an end opening;
- 5 b) a propeller section positioned in said through passageway;
- c) two extension members that are positioned at opposite sides of the central housing, with each extension member having an inner end portion adjacent to a
10 related one of said outer end portions of the central housing and extending outwardly therefrom, each extension member having a lower perimeter edge portion which is located at an elevation lower than the end openings of the center housing, each extension
15 member having a downwardly facing surface that defines a flow passageway at the downwardly facing surface, said flow passageway having an inner end flow passageway portion adjacent one of the end openings of the center housing;

d) said thruster being configured and arranged, so that with the thruster located in an operating position with the thruster operating to provide a lateral thrust, the two extension members have their lower perimeter edge portions located so that as water flows by the lower perimeter edge portions and into one of the end openings of the center housing, ambient air is substantially prevented from being entrained in the water entering into the center housing.

31. The thruster as recited in claim 30, wherein each end opening of the housing is defined by a surrounding rim, and at least a substantial portion of the perimeter edge portion of the extension member which is adjacent to that surrounding rim is below an uppermost portion of said surrounding rim by a distance between about one quarter to three quarters of a depth dimension of the end opening defined by the surrounding rim.

32. The thruster as recited in claim 30, wherein each end opening of the housing is defined by a surrounding rim, and

at least a substantial portion of the perimeter edge portion of the extension member which is adjacent to that surrounding rim is below an uppermost portion of said surrounding rim by a distance that is at least about one-half of a depth dimension of the end opening defined by the surrounding rim.

33. The thruster as recited in claim 30, wherein each end opening of the housing is defined by a surrounding rim defining the end opening, each of said end openings having a depth dimension, each extension member having an inner end portion adjacent to its related end opening, an outer end portion, and a length dimension from said inner end portion to the outer end portion, with a length dimension from said inner end portion to said outer end portion of the extension member being at least as great as the depth dimension of its related end opening.

34. The thruster as recited in claim 33, wherein said length dimension is at least as great as one and one-half times said depth dimension.
- 5 35. The thruster as recited in claim 30, wherein each end opening of the housing is defined by a surrounding rim having a depth dimension, each of said extension members having a maximum width dimension extending from one side of said extension member to the other side thereof, said
10 maximum width dimension being at least about equal to or greater than the depth dimension of the end opening of the housing adjacent to that extension member.
- 15 36. The thruster as recited in claim 30, wherein each of said extension members has its downwardly facing surface shaped to have a greater depth dimension at said inner end flow passageway portion and a lesser depth dimension at an outer end portion of said extension member.

37. The thruster as recited in claim 36, wherein said flow passageway having an inward and upward slope to said inner end flow passageway portion.

5 38. The thruster as recited in claim 37, wherein the downwardly facing surface of the extension member forms a hydro-dynamically contoured surface having a concave surface that is generally curved upwardly and inwardly to the opening of the housing.

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39. A method of providing lateral thrust in a boat comprising a hull having a water line, side walls, a bottom wall, and a transom, with said bottom wall comprising two wall sections which extend from side locations in a downward and laterally inward slant to a central juncture location of the two bottom wall sections, and with said transom meeting said bottom and side walls at bottom and side rear edge locations thereof, said boat having a lateral thrust operating mode where the boat is stationary or is moving at a sufficiently low speed so that water remains adjacent to the transom, and a

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higher speed operating where water separates from the transom to form a transom wake surface, said method comprising:

a) providing a thruster by:

- 5 i) providing a central thrusting section which has a lengthwise axis and comprises a central housing that defines a through passageway that is generally aligned with said lengthwise axis and has two oppositely positioned outer end portions, each of which defines an end opening and a propeller section positioned in said through passageway;
- 10 ii) positioning two extension members at opposite sides of the central housing to form said thruster in a manner that each extension member has an inner end portion adjacent to a related one of said outer end portions of the central housing with the extension members extending outwardly therefrom, and each extension member having a lower perimeter edge portion,
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- b) positioning the thruster with the two extension members in an operating position at the transom of the boat, so that the perimeter edge portions of the two extension members are below the water line of the boat, with each extension member having a downwardly facing surface that defines a flow passageway at the downwardly facing surface, and with said flow passageway having an inner end flow passageway portion adjacent one of the end openings of the central housing,
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- 10 c) operating the boat with the thruster positioned so that during a time period when the boat is in said lateral thrust operating mode to cause a lateral thrust, the two extension members are positioned so that their lower perimeter edge portions are located so that as water flows by one of the lower perimeter edge portions and into one of the end openings of the center housing, ambient air is substantially prevented from being entrained in the water entering into the central housing, and during a time period when the boat is operating during the higher velocity operating mode the thruster is substantially
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- 20 clear of the water that is at the transom wake surface.

40. The method as recited in claim 39, further comprising providing each end opening of the housing defined by a surrounding rim, with at least a substantial portion of the perimeter edge portion of the extension member which is adjacent to that surrounding rim being below an uppermost portion of said surrounding rim.
41. The method as recited in claim 40, wherein said substantial portion of the perimeter edge portion of each extension member is positioned below the upper portion of the surrounding rim by a distance that is at least about one-half of a depth dimension of the end opening defined by the surrounding rim.
42. The method as recited in claim 41, wherein said substantial portion of the perimeter edge portion of each extension member is positioned below the upper portion of the surrounding rim by a distance between about one-quarter to

three-quarters of a depth dimension of the end opening defined by the surrounding rim.

43. The method as recited in claim 39, wherein each end opening of the housing defined by a surrounding rim has a depth dimension, and each extension member has an inner end portion adjacent to its related end opening, an outer end portion, and a length dimension from said inner end portion to the outer end portion, said method further comprising providing said extension members and said central thrusting section so that a length dimension from said inner end portion to said outer end portion of the extension member is at least as great as the depth dimension of its related end opening.

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44. The method as recited in claim 43, wherein said extension members and said central thrusting section of said thruster are provided so that said length dimension is at least as great as one and one-half times said depth dimension.

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45. The method as recited in claim 39, wherein each end opening of the housing is defined by a surrounding rim having a depth dimension, each of said extension members having a maximum width dimension extending from one side of said extension member to the other side thereof, said maximum width dimension being at least about equal to or greater than the depth dimension of the end opening of the housing adjacent to that extension member.
- 10 46. The method as recited in claim 39, wherein each of said extension members has its downwardly facing surface shaped so the flow passageway has a greater depth dimension at said inner end flow passageway portion and a lesser depth dimension at an outer end portion of said extension member.
- 15 47. The method as recited in claim 46, wherein said flow passageway has an inward and upward slope to said inner end flow passageway portion.

48. The method as recited in claim 39, wherein the downwardly facing surface of the extension member forms a hydrodynamically contoured surface that is generally curved upwardly and inwardly to the opening of the housing.